

## CLAIMS

We claim:

1. A solid state reaction method for the production of tetrabasic lead sulfate by reacting  $4\text{PbO}$  and  $\text{PbSO}_4$ , comprising the steps of:

(a) mixing the stoichiometric mixture of  $4\text{PbO}$  and  $\text{PbSO}_4$ ,

(b) heating the stoichiometric mixture of  $4\text{PbO}$  and  $\text{PbSO}_4$  at a temperature between  $500$  and  $700^\circ\text{C}$  during 3 to 8 hours.

(c) deagglomerating and sieving the resulting tetrabasic lead sulfate

2. A solid state reaction method for the production of tetrabasic lead sulfate by reacting  $3\text{PbO}\cdot\text{PbSO}_4\cdot\text{H}_2\text{O} + \text{PbO}$ , comprising the steps of

(a) mixing the stoichiometric mixture of  $3\text{PbO}\cdot\text{PbSO}_4\cdot\text{H}_2\text{O} + \text{PbO}$ ,

(b) heating the stoichiometric mixture of  $3\text{PbO}\cdot\text{PbSO}_4\cdot\text{H}_2\text{O} + \text{PbO}$  at a temperature between  $500$  and  $700^\circ\text{C}$  during 3 to 8 hours.

(c) deagglomerating and sieving the resulting tetrabasic lead sulfate

3. A solid state reaction method according to claim 2, wherein said mixture of  $3\text{PbO}\cdot\text{PbSO}_4\cdot\text{H}_2\text{O} + \text{PbO}$  is obtained from active materials coming from the pastes used for the preparation of the lead-acid battery plates, or coming from recycled lead-acid battery plates.

4. A solid state reaction method for the production of tetrabasic lead sulfate by reacting 5PbO + H<sub>2</sub>SO<sub>4</sub>, comprising the steps of:

- (a) mixing the stoichiometric mixture of 5PbO + H<sub>2</sub>SO<sub>4</sub>,
- (b) heating the stoichiometric mixture of 5PbO + H<sub>2</sub>SO<sub>4</sub> at a temperature between 500 and 700°C during 3 to 8 hours.
- (c) deagglomerating and sieving the resulting tetrabasic lead sulfate

5. A solid state reaction method for the production of tetrabasic lead sulfate by reacting 4PbO + PbCO<sub>3</sub> + H<sub>2</sub>SO<sub>4</sub>, comprising the steps of:

- (a) mixing the stoichiometric mixture of 4PbO + PbCO<sub>3</sub> + H<sub>2</sub>SO<sub>4</sub>,
- (b) heating the stoichiometric mixture of 4PbO + PbCO<sub>3</sub> + H<sub>2</sub>SO<sub>4</sub> at a temperature between 500 and 700°C during 3 to 8 hours.
- (c) deagglomerating and sieving the resulting tetrabasic lead sulfate

6. A solid state reaction method for the production of tetrabasic lead sulfate by reacting 5PbO + (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, comprising the steps of:

- (a) mixing the stoichiometric mixture of 5PbO + (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>,
- (b) heating the stoichiometric mixture of 5PbO + (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> at a temperature between 500 and 700°C during 3 to 8 hours.
- (c) deagglomerating and sieving the resulting tetrabasic lead sulfate

7. A lead-acid battery paste made with the tetrabasic lead sulfate obtained according to the method of claim 1, the production of lead-acid battery plates made with said paste, and the production of lead-acid batteries subsequently made with them.

8. A lead-acid battery paste made with the tetrabasic lead sulfate obtained according to the method of claim 2, the production of lead-acid battery plates made with said paste, and the production of lead-acid batteries subsequently made with them.

9. A lead-acid battery paste made with the tetrabasic lead sulfate obtained according to the method of claim 3, the production of lead-acid battery plates made with said paste, and the production of lead-acid batteries subsequently made with them.

10. A lead-acid battery paste made with the tetrabasic lead sulfate obtained according to the method of claim 4, the production of lead-acid battery plates made with said paste, and the production of lead-acid batteries subsequently made with them.

11. A lead-acid battery paste made with the tetrabasic lead sulfate obtained according to the method of claim 5, the production of lead-acid battery plates made with said paste, and the production of lead-acid batteries subsequently made with them.

12. A lead-acid battery paste made with the tetrabasic lead sulfate obtained according to the method of claim 6, the production of lead-acid battery plates made with said paste, and the production of lead-acid batteries subsequently made with them.